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AUTHOR McMeen, George R.
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ABSTRACT

In response to increasing demands for computer literacy, the University of Nevada/Reno College of Education, in cooperation with the Burroughs Corporation, developed a training program to acquaint future and inservice teachers with computer use and the potentials of computer education. In this model, groups of learners are stratified by levels of interest, skills, and abilities in relation to hardware and courseware concerns. Training progresses through four levels: (1) familiarization--teachers gain basic level skills in using hardware as well as an orientation to the possible uses of microcomputers in schools; (2) specialist/curriculum--teachers develop a sufficient background and critical perspective to facilitate the use of computers in their teaching; (3) teacher/author--teachers understand courseware and software design, and some orientation to programming; and (4) teacher/disseminator--teachers acquire an understanding of the computer and classroom organization, school resources priorities, computer literacy, new materials, dissemination case studies, and advances in hardware. The organization and structure of the training model are described, and its implications for future redesigning of curriculum are discussed. (JD)

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# IMPLICATIONS OF A COMPUTER EDUCATION MODEL FOR TEACHER TRAINING

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George R. McMeen
College of Education
University of Nevada-Reno
Reno, NV 89557

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## Introduction

A growing wave of involvement with microcomputers in the U.S. encompasses academic disciplines and subjects at all educational levels. Computer literacy and teacher training are important concerns in this trend. Ingersoll and Smith (1984) indicate that two-thirds of the schools in America already have at least one microcomputer in their facilities and half of these have more than one. This is the equivalent of 1 microcomputer for every 450 students (Shavelson, Winkler, Stasz, and Robyn, 1983). Despite this fact, educators often find themselves unprepared to meet the new demands of an accelerating technology, which has been largely underutilized in education (Anandam and Kelly, 1982).

In Nevada, as in other states, many forces have been set into movement that affect the quality of education using "high" technology. For example, Governor Bryan's Commission on Excellence in Education has addressed issues raised in A Nation At Risk (National Commission on Excellence in Education, 1983). There is now a general concensus that students entering college should know how to use computers (Nevada Joint Council on College Preparation, 1984). The Governor's Commission will likely recommend to the Nevada legislature a state requirement of 1/2 year of computer education as a graduation requirement, a goal of computer literacy for teachers and students, and a funding recommendation for computer hardware capital outlay for county school districts. In an age of growing computer utilization,

computer "literacy" has become as essential to human autonomy as a knowledge of reading and writing (Barger, 1983). How Nevada and other states will respond to the new challenges of the technological revolution in education is an issue of utmost concern.

As an institution of higher learning involved in the professional preparation of teachers, the College of Education at the University of Nevada-Reno became involved in 1983-84 in a national consortium project sponsored by the Burroughs Corporation to address some of the key issues raised by the President's Commission. Each college of teacher education that participated in this consortium was asked to present a research and/or software development proposal. The UNR College of Education offered a plan envisioning cooperative efforts with its own sister arts and science college in searching for solutions relating to five key areas of teacher preparation: English, mathematics, science, social studies, and computer science. In return for their participation, the Burroughs Corporation, a maker of computer technology, agreed to provide each member institution with microcomputer systems and training support to assist in the search for ways to improve American education. Participation would be divided into three phases-- (1) computer literacy and curricular planning; (2) program development and research; (3) implementation and final evaluation. The goal of the national consortium is to reduce the nation's "risk" by introducing and utilizing computer technology to change the way in which teacher preparation is accomplished and by addressing

the five basic areas of needed change recommended by the National Commission (English, mathematics, science, social studies, and computer science) through the attainment of teacher mastery of important basic curricula. This would represent the integration of a technological medium, now imbedded in our society, into an instructional delivery mode for future teacher preparation. An anticipated goal would be to better educate future teachers who will in turn improve the quality of K-12 education.

Integral to this particular proposal is the need for effective cooperation between the College of Education and Arts & Science. Often, faculty with joint appointments may teach courses offered in a second college. This may lead to improvements in the quality of instruction, since one college may be rich in teaching methodology and the other in content in particular disciplines.

## Elements of a Successful Model

A computer education model for teacher training must take into account the needs, interests, skills and abilities of its faculty and students. There are two perspectives from which we may view such a model: (1) Faculty development within a teachers college, or between that college and a sister college of arts and science, and (2) pre-service and in-service training for teachers. A common denominator of both perspectives may be found in the likely existence of a stratified user society similar to that shown in Figure 1 (McMeen, 1984). These stratified

**Figure 1**

**Stratified Faculty User Groups**

| Hardware | Courseware |
|---|---|
| **Group 1** | |
| Users possess computer skills, including a knowledge of programming language(s). | May be involved in designing and implementing courseware. |
| **Group 2** | |
| Users have fewer computer skills and lack a knowledge of a programming language. | May lack courseware design and implementation skills and may be dependent upon searching for and using previously developed courseware. |
| **Group 3** | |
| Users lack computer skills and a knowledge of how to use computers to improve instruction, but are interested in possibly utilizing computers. | May lack courseware design and implementation skills and may have little knowledge of courseware and how to integrate it into the curriculum. Although not actively searching for courseware, may be interested in using identifiable courseware. |
| **Group 4** | |
| Non-users. | Non-users. |

groupings offer a means of viewing the needs of prospective users by determining their level of interests, skills, and abilities in relation to hardware and courseware concerns. An important observation in determining the stratification levels of a particular faculty or group of student teachers would be to ask whether participants have computer skills, what these skills are, and whether this group is involved in designing and implementing its own courseware. Based upon this information, it might be noted that in reality these people have fewer computer skills and lack an understanding of programming to the extent that courseware design and implementation skills are largely absent. Some participants may simply be dependent upon previously prepared software/courseware, but even they may be concerned with improving their skills. Some teachers may be so interested that they will become "movers" in utilizing micros in their courses and in using identifiable courseware as well as recommending microcomputer utilization to colleagues. These persons may become so involved in microcomputer education that they are in fact motivators for others as well as resource persons. School principals have already discovered this inasmuch as they have delegated responsibilities in many instances to committed teachers to manage the details of computer implementation policies within their schools (Shavelson, Winkler, Stasz, and Robyn, 1983).

It is important at the same time to keep in mind general areas of focus such as learning about microcomputers, learning with microcomputers, and learning practical applications of

micros (Miller, 1983). Petruso (1981) suggests four areas of concentration for in-service programs: (1) microcomputers in education, (2) equipment operation and configuration, (3) special software packages and teacher utility programs, and (4) using the computer in instruction. These are important concerns in developing either a model for faculty development or a teacher training program for pre-service and in-service teachers. It is necessary to consider ways of stimulating interest as users are oriented to possible uses/applications of micros, applying ideas related to specific curricula or courses, and providing opportunities for advanced utilization (perhaps programming and software development or selection and evaluation). Lewis (1983) identifies four levels of teacher training: (a) familiarization, (b) specialist-curriculum, (c) teacher-author, and (d) teacher-disseminator. In the first of Lewis' levels (familiarization), teachers gain basic level skills in utilizing hardware as well as an orientation to the possible uses of micros in schools. In the second level (specialist-curriculum), they develop a sufficient background and critical perspective which would facilitate the use of computers in their teaching. This level is appropriately named, for they become specialists in their curriculum, developing a knowledge of the issues of courseware and software design and evaluation. The third level (teacher-author) has aspects of software/courseware design, an extensive review of existing materials, and some orientation to programming. The fourth and last level (teacher-disseminator) involves an understanding of the computer and classroom

organization, school resource priorities, computer literacy, new materials, dissemination case studies, advances in hardware and recent publications (Lewis, 1983, p. 86).

A computer education model may also provide opportunities for participants to clarify goals in relation to their own school situation. Activities can be designed to help participants set new individual goals, possibly team goals, and objectives for the use of microcomputers in the classroom and school or college. To be effective, these exercises should be done in the context of providing opportunities for participants to work on those goals. Otherwise expectations might be raised without achieving intended results.

A program of evaluation should also be built into a successful model. A program of evaluation that is well planned should have key decision points at which analyses of data would provide indications of whether to continue or discontinue a program (Flanagan, 1968).

In the larger context of curriculum development, which should be considered in any teacher training model, there are several key principles relating to curriculum change that were identified in a major study by the Rand Corporation (1978). Findings of that study which may have a bearing upon a computer education model for teacher training include the following:

1. Teachers often represent the best clinical expertise available in terms of their knowledge about the practice of teaching.

2. In a sense, teachers need to "reinvent the wheel" each time curriculum change is brought to or generated within the context of the school.

3. Professional learning is a long-term, non-linear process.

4. Staff development should be seen as an on-going part of the school program improvement process.

With respect to the first finding, it is a generally accepted principle of successful workshops that frequently local identity must be preserved to the extent of recruiting some workshop staff from local faculty. These people may be resource persons who can be helpful in the process of engendering faculty interest and suggesting possible applications of microcomputer technology to others. In terms of the second one, teachers often need to take a second look at their curricula, interpreting new methods and ways to efficiently and effectively introduce information and facilitate learning and retention. To a large extent, this may be repetitive of previous efforts. However, in the sense that microcomputer applications are a relatively new phenomenon, this is more likely to be new ground rather than a "reinvention of the wheel." The third finding reminds us that hoped for outcomes are non-linear; they may occur at other than expected times. In fact, real faculty development may only occur after several months or years of effort and long periods of seemingly slow progress. Lastly, staff or faculty development is acknowledged as a fundamental process within the context of an academic setting.

A Computer Education Model for Teacher Training

The College of Education (University of Nevada-Reno)/Burroughs microcomputer project is designed to serve principally three target groups:

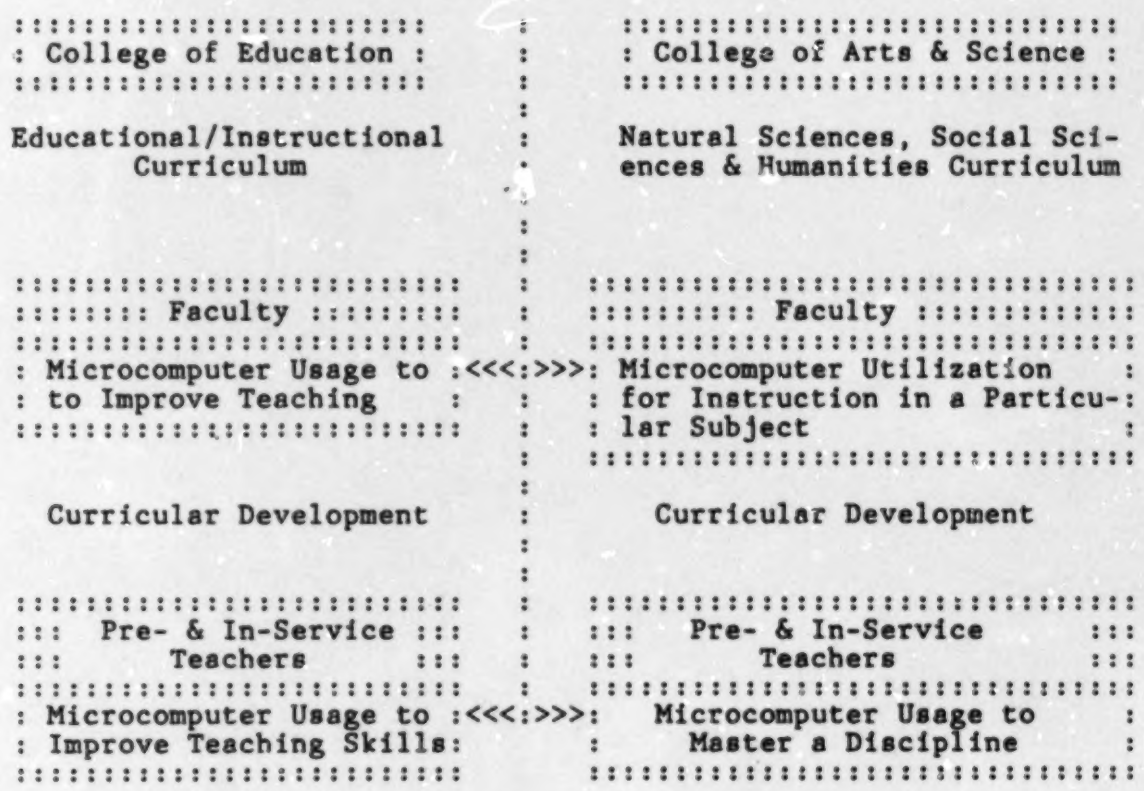
1. The faculty of the College of Education and College of Arts and Science;
2. Undergraduate students who are preparing to be teachers;
3. Teachers who are currently employed professionally in surrounding public schools.

Improvement in the quality of instruction at collegiate and public school levels is central to this project. Ultimately, elementary and secondary students will benefit as changes are made in their curricula that will embrace meaningful applications of new technology.

Specific research projects in the Burroughs proposal involve the application of Burroughs software to educational situations and their evaluation. For example, acquisition of word processing skills among middle school and high school students, development of a computerized software/courseware evaluation instrument, teacher training, student advisement using a specific data-manager program, and creation of reading/phonetics software. The model shown in Figure 2 is central to these activities. Implicit in this model is the planned cooperation between two colleges in areas of curricular planning for pre-service and in-service teachers. This model must of necessity involve the use of faculty teams who not only acquire new skills, even computer

**Figure 2**

**A Model for Organizational and Curricular Redesign for Teacher Education Instruction**


College of Education
College of Arts & Science
Educational/Instructional Curriculum
Natural Sciences, Social Sciences & Humanities Curriculum
Faculty
Faculty
Microcomputer Usage to to Improve Teaching
Microcomputer Utilization for Instruction in a Particular Subject
Curricular Development
Curricular Development
Pre- & In-Service Teachers
Pre- & In-Service Teachers
Microcomputer Usage to Improve Teaching Skills
Microcomputer Usage to Master a Discipline

literacy when necessary, but who plan joint curricular goals. Thus a team building approach is an essential component. In this particular model, two colleges with their separate curricular emphases may create opportunities for faculty to acquire microcomputer skills that will improve teaching or instruction in a particular subject. If a team approach is developed and opportunities for goal setting leading to curricular development are present, curricular change may lead to improvements in the instructional use of microcomputers in the classroom. The direct result of the acquisition of technological skills will benefit pre-service teachers who may be enrolled in courses in either one or both colleges. It will certainly benefit in-service teachers too (but it may be anticipated that undergraduates might benefit more through the use of microcomputer technology in courses in the two colleges since their coursework might, for example in secondary areas, involve a larger number of courses in arts and science).

## Implications

The success of a model of inter-departmental and/or inter-collegiate cooperation must inevitably rest upon the willingness of individuals to accept innovation and the need for curricular change. Interest in microcomputer technology and curriculum development must be stimulated across disciplinary boundaries in a way that will encourage participants to see the importance of this technology in their own subject areas or disciplines. Thus,

teacher training institutions must create a conducive atmosphere for professional growth. Within this positive climate, collegiate faculty and pre- and in-service teachers will become more interested in "high" technology as the microcomputer is perceived to be a relevant part of the professional life of teachers.

Demonstrating the importance of the microcomputer to a particular subject or discipline is no easy matter. A positive method that has had good results would be to find other faculty in the same discipline who are already using micros and/or have some insights worth sharing. These insights might relate to their perceptions of how the computer may be a unique and appropriate instructional tool for their fields. Again, the use of teams of faculty might lead to team-building and acquisition of skills resulting in curricular revision and innovation.

The model which has been described suggests that organizational design of teacher education utilizing microcomputers will lead to curricular redesign. Implicit is the idea that curricular growth will accompany microcomputer utilization and the development of computer literacy when they are brought to collegiate faculties. It must be underscored that curricular innovation is a team effort. Frequently, it is a few committed individuals who introduce and use microcomputers in their own instruction. But, if microcomputer education, is to affect the larger context of academic curricula, a team approach must become a goal.

The model also implies that students (pre- and in-service teachers) in teachers college institutions will benefit. This second result is conditional upon the acceptance of collegiate faculties of the idea that there is a need for curricular innovation using modern technology and that microcomputer technology will be not only the seed for such change but also an integral component of any curriculum.

To a very large extent, the microcomputer revolution has been a "bottom-up" revolution resulting from public acceptance of the microcomputer as a very necessary part of the fabric of our society. The model suggested in Figure 2 is one that proceeds from the top down; i.e., it presumes that curricular change will result from faculty teams working together to plan how to improve their curricula using high technology. Traditionally, collegiate faculties have been slow to respond to the need for curricular change. Yet, it appears that for curricular change to have any significance they must be convinced of the positive, lasting effects of microcomputer utilization. The need for this particular model has sprung from the bottom-up revolution. Youth have been among the first to embrace the new technology and see its possible applications. It is their acceptance of computer technology as an important aspect of our information society that has led faculties to realize that there might be imperative reasons why the computer should be used in teaching certain concepts. It is the faculties who should now see the merits for curricular change. Either older faculties will modernize, or the next generation, which will likely possess a higher level of

acquired microcomputer skills, will bring to collegiate institutions.

## Conclusion

Microcomputers are an important instructional resource. It is certain that inexpensive microcomputers will change American education probably more dramatically than any other development that can be found on the horizon. Curricula should use the technology and materials that are now having so much impact on our society (Sharkan and Goodman, 1982). We live in an age of rapid technological change which will affect the curricula of our educational institutions. Our response to the microcomputer revolution should be relevant, flexible, imaginative, and carefully reasoned in its relationship to the needs of students and society's expectations of teacher training. We have a unique opportunity and role for using microcomputer technology as a structurally integrated part of our teaching. It is in this context that computer education models for teacher training institutions must focus on substantive changes in their curricula and cooperative team efforts with faculty of other colleges.

References

Anandam, K., and Kelly, J.T. Teaching and Technology: Closing the Gap. Technological Horizons in Education Journal, 1982, 10(2), 84-90.

Barger, R.N. The Computer as a Humanizing Influence in Education. Technological Horizons in Education Journal, 1983, 10(7), 109-111.

Federal Programs Supporting Educational Change. Eight Volumes, R-1589. Santa Monica, CA: Rand Corporation, 1978.

Flanagan, J.C. Administrative Behavior in Implementing Educational Innovations. Invited Address Presented at the American Educational Research Association Meeting, Chicago, February 8, 1968. ED 023 182

Haefner, K. Challenge of Information Technology to Education: The New Educational Crisis. Technological Horizons in Education Journal, 1982, 9(1), 47-52.

Ingersoll, G.M., and Smith, C.B. Availability and Growth of Microcomputers in American Schools. Technological Horizons in Education Journal, 1984, 11(11), 84-87.

Lewis, R. Teachers, Pupils, and Microcomputers. Technological Horizons in Education Journal, 1983, 10(4), 81-87.

McMeen, G.R. Developing Computer Literacy Workshops for College Faculty. Educational Technology, 1984, 24(4), 25-29.

Miller, F. Bits and Bytes in the Ivory Tower: Perspectives and Promises. Collegiate Microcomputer, 1983, 1(1), 77-81.

The National Commission on Excellence in Education. A Nation At Risk. A Report to the Nation and the Secretary of Education, United States Department of Education, April 1983.

Nevada Joint Council on College Preparation. Making High School Count. University of Nevada Board of Regents and State Board of Education, 1984.

Petruso, S. A Commitment to Computer Education: Introducing Computers into a District. Technological Horizons in Education Journal, 1981, 8(6), 53-58.

Sharkan, W., and Goodman, J.E. Improving the Climate for Educational Technology. Instructional Innovator, 1982, 27(5), 12-13.

Shavelson, R.J., Winkler, J.D., Stasz, C., and Robyn, A.E.

Teachers' Instructional Uses of Microcomputers. A Paper Presented at the American Education Research Association, Montreal, Canada, April 12, 1983.